

Tabebuia donnell-smithii Rose Primavera

Bignoniaceae Bignonia family

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Tabebuia donnell-smithii Rose, commonly known as primavera, produces a wood valuable for furniture, trim, and veneer. This large tree (fig. 1) is planted for timber and also as an ornamental, partly because of its impressive seasonal display of yellow flowers.

HABITAT

Native Range

The native range of primavera (fig. 2) extends from the Mexican state of Nayarit through the states of Chiapas and Veracruz (9, 16, 20) to Guatemala (11) and El Salvador (10, 14), and reaches central Honduras (8, 10). This area lies between 13° and 21° N. latitude. Outside the native range, primavera has been tested as a timber tree in Costa Rica (4, 7), Hawaii (19), and Puerto Rico (15). It is also planted as an ornamental in a number of areas throughout the world (2, 12, 17, 18, 23).

Climate

Mean annual rainfall in primavera's native range varies from about 1000 to 3000 mm/yr, the majority of which falls during the summer (8, 28). A short dry season of 2 to 3 months occurs during January, February, and March (21). The mean annual temperature ranges from 23 to 28 °C, and the mean temperature in the coldest month ranges from 17 to 23 °C (28). Frosts do not occur in the natural range of primavera.

Soils and Topography

Primavera requires good sites. In the native range, it grows on alluvial soils and soils derived from volcanic ash, metamorphic rock, and limestone (10). Suitable soil textures range from sandy loam to clay loam, with pH's from 5.5 to 7.5. Well-drained soils are best, although somewhat excessively drained and moderately well-drained soils (without impermeable subsoils) can still produce good trees (5). Alluvial terraces and lower colluvial slopes are the best topographic positions; deep soils are required in rocky areas. Primavera grows from elevations near sea level to around 1,000 m (9).

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Associated Forest Cover

In Chiapas, Mexico, on steep slopes over metamorphic rocks between elevations of 150 and 800 m, primavera grows in forests dominated by *Terminalia oblonga* (R. & P.) Steud. or *Virola guatemalensis* (Hemsl.) Warb., with important associates *Aspidosperma megalocarpum* Muell. Arg., *Myroxylon balsamum* (L.) Harms, *Vatairea lundellii* (Standl.) Killip, *Dendropanax arboreus* (L.) Planch. & Decne., *Calophyllum brasiliense* Camb., *Ficus crassiuscula* Warb., *Bursera simaruba* (L.) Sarg., *Tetrorchidium rotundatum* Standl., and *Sterculia apetala* (Jacq.) Karst. (22). The semideciduous forests on the Pacific slope of central Mexico often host the following association containing primavera: *Astronium graveolens* Jacq., *Bernoullia flammea* Oliver, *Calophyllum brasiliense* Camb., *Cordia alliodora*



Figure 1.—A 36-year-old primavera (*Tabebuia donnell-smithii*) tree growing in Puerto Rico.

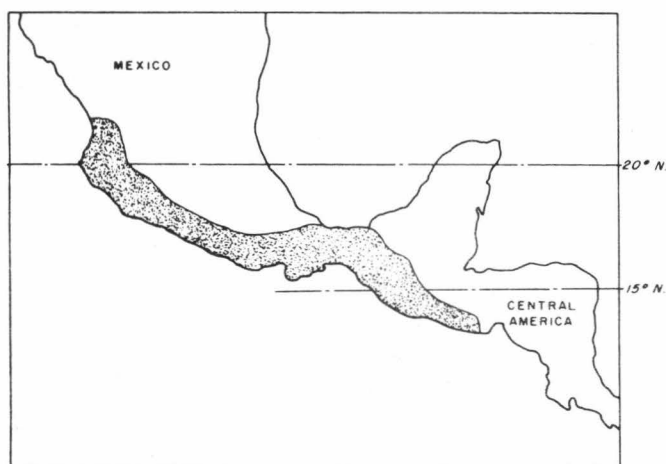


Figure 2.—Native range of primavera (*Tabebuia donnell-smithii*) in Mexico and Central America.

(Ruiz & Pav.) Cham., *C. elaeagnoides* DC., *D. arboreus*, *Enterolobium cyclocarpum* (Jacq.) Griseb., *F. cotinifolia*, *F. involuta* (Liebro.) Miq., *F. mexicana* Miguel, *Hura polyandra* Baill., *Luehea candida* (DC.), *Hymenaea courbaril* L., *Lysiloma divaricatum* (Jacq.) Macbride., *Swietenia humilis* Zucc., *Tabebuia palmeri* Rose., and *T. rosea* (Bertol) DC. (20).

LIFE HISTORY

Reproduction and Early Growth

Flowering and Fruiting.—Primavera produces bright yellow flowers, 2 to 2.5 cm wide, in clusters at the branch ends (14, 20). Flowering occurs during the dry (leafless) season and can last for almost 2 months (18). The seedpods are from 25 to 50 cm long, straight, pendulous, and brown when ripe (20). They mature 4 months after flowering (5) and split open to release their seeds.

Seed Production and Dissemination.—The seeds, which are produced in great quantity, are thin, flat, and surrounded by a papery wing. There are about 170,000 seeds per kilogram. These light seeds can travel hundreds of meters in strong winds. Collection of seedpods may begin as soon as their color changes from green to brown (10). Large quantities of pods can be collected from trees felled in logging projects or small quantities of seed can be gathered from the ground. Spread in the sun, the pods will open in 2 or 3 days, but the seeds should be dried an additional 1 to 2 weeks to 5- or 6-percent moisture for storage (8). The seeds may be stored in airtight containers at ambient temperature for up to 1 year (28).

Seedling Development.—Germination of primavera seeds is epigeous. Seeds should be germinated in shaded beds or trays in loose, fertile media kept moist but well drained. The seeds should be very lightly covered with fine sand or similar media to protect against drying. Seeding density should be 540 seeds per square meter of bed (10). The seeds will germinate in 12 to 18 days (28). One seedlot

from Puerto Rico gave a 19-percent germination rate (author, personal observation). Watering of new seedlings must never be excessive, or damping-off may result. Primavera seedlings should be transplanted to nursery bags or nursery beds at a 0.3- by 0.3-m spacing in about 3 weeks, or when they are 2.5 to 5 cm tall (10). Grown in nursery bags, the seedlings will reach plantable size (40 cm tall) about 4 months after transplanting. Seedlings grown in nursery beds for stump plants (bare-root stock with most of the top pruned away) should be grown to a height of about 1 m. This should occur 7 to 9 months after transplanting (5). The tops are cut off about 10 cm above the ground before the seedlings are lifted. The roots are lightly pruned and dipped in a clay slurry, bundled in moist peat or burlap, and planted in the field as soon as possible. Stump plants have been used very successfully in Honduras (5). Fairly wide spacing is required due to a full-light requirement and rapid growth. Spacing of primavera plantations in Honduras were generally 9 by 4.5 m (240 trees/ha). Closer spacings have been tried, but no improvement in form was achieved.

Vegetative Reproduction.—Young primavera are able to coppice at least until they reach pole size.

Sampling and Pole Stage to Maturity

Growth and Yield.—Limited information about the growth of primavera is available. It appears that a height growth of 1.5 to 2 m/yr is possible on good sites for the first 10 years or so. Height growth gradually tapers off until a maximum height of 25 to 35 m is reached. Diameter growth on good sites ranges from about 1 to 3 cm/yr. A diameter at breast height (d.b.h.) of up to about 1 m can be reached (10). Mean heights and d.b.h.'s of several plantations of varying ages around the world are reported in table 1. The plantation at Cambalache, Puerto Rico, had high survival but poor growth because the soil was very shallow and was over porous limestone.

In natural stands in Mexico, harvestable primavera trees are often widely scattered, the average not exceeding five trees per hectare (16). A 32-year-old plantation in Guatemala averaged 600 board feet (about 2 m³) per tree; a fully stocked stand could yield 446 m³, or 14 m³/ha/yr (11). Another source quotes potential production figures for the species at 20 to 30 m³/ha/yr (28). A sawlog rotation of 35 years has been suggested (10). On the best sites, 30 years would probably be sufficient to produce large, high-quality logs.

Generally, the form of primavera is excellent (28). Early suppression can cause low branching and leaning toward the light (5). Because of this, underplanting with release the following year has been shown to be a poor establishment method. Forks in the stem are frequently seen during normal growth, and although one leader will eventually dominate the other, a minor crook develops at that point. This defect can be avoided by pruning one of the branches each time a fork forms (5).

Rooting Habit.—Seedlings grow a deep, strong, fleshy taproot. Large lateral roots are gradually developed. Primavera trees have small buttresses, and some fluting can occur in large trees.

Reaction to Competition.—Primavera is light-demanding. The species is a pioneer and habitually seeds into aban-

Table 1.—Mean diameter at breast height (d.b.h.) and height of several plantations of primavera (*Tabebuia donnell-smithii*) in four countries

Location	Age	D.b.h.	Height	Reference
	Years	cm	m	
Puerto Rico				
Cambalache	2	.....	1.5	24
	4	3.8	3.4	25
	36	10.9	11.4	*
Catalina	2	.....	3.0	24
	4	11.4	9.1	25
	10	18.2	13.2	#
	36	47.5	31.0	*
Honduras				
Cortez	4	.....	2.3	21
Costa Rica				
La Isla	14	15.6	.....	7
Campo Gama	2	.....	3.0	7
	6	18.1	.....	7
	9	23.2	.....	7
Desechada 507	10	18.8	14.1	4
Parcela Radial 105	8	9.0	10.8	4
Parcela Radial 106	4	10.5	11.5	4
Parcela Radial 108	6	6.3	6.9	4
Hawaii				
Oahu	5.6	.....	2.4	29
Unidentified site	40	51.0	17.0	19

*Measurements made by the author.

#Data on file at the Institute of Tropical Forestry, Southern Forest Experiment Station, USDA Forest Service, Rio Piedras, Puerto Rico.

dozed farmland, disturbed areas, and roadsides in its native range (5). Seedlings and saplings can survive for a number of years under parent trees or other open-crowned secondary species, but will make little growth without full sunlight. Naturally grown primavera is usually replaced after the first generation by more shade tolerant species that seed in as the stand develops. High mortality and slow growth can occur in plantations if the former overstory is not completely removed or if sprouts and weeds are not adequately controlled after planting. On good sites, weeding is generally necessary for only 2 years because primavera is usually taller than the weeds and brush by that time (5). Fairly high basal areas can be carried in mature stands. One 36-year-old plot in Puerto Rico contained 87 m²/ha of basal area.

Damaging Agents.—No serious disease or insect problems have been reported. An unidentified insect destroys some of the seeds produced by trees in Puerto Rico. The degree of resistance of the wood to termites is unknown. Primavera heartwood is generally very durable when exposed to white- and brown-rot fungi and weathers well (27).

Durability, however, is variable, as are many of the wood properties of primavera (6).

SPECIAL USES

Primavera is an important timber tree in its native range. Its logs demand a high price (1), and the grade yields of lumber are reported to be extremely good for a hardwood (13). Although the abundance of primavera has been reduced in natural forests by heavy cutting, planting programs promise to increase the amount of wood available (5, 11, 16). The wood is cream-colored, yellow, or light brown, often striped, with no clear transition from sapwood to heartwood (6). The grain is straight to "roey" (mottled) and medium to coarse textured. Specific gravity is about 0.44 g/cm³, and moisture content of green wood is around 62 percent (27). The wood air-dries rapidly with little loss of grade (27). Wood with 12-percent moisture had a bending strength of 6,571 newtons/cm², a modulus of elasticity of 717 newtons/cm², and a maximum crushing strength of 3,861 newtons/cm² (6). During seasoning, primavera wood shrinks 3.1 percent radially, 5.2 percent tangentially, and 8.7 percent volumetrically (26). The wood saws and machines very easily and finishes well (6). The principal uses for primavera wood are for furniture, decorative veneer, trim, structural lumber, and fuelwood (3).

Primavera is a good shade tree for roadsides, parks, and large estates. Although it loses its leaves during the dry season, the impressive yellow floral display more than compensates for any loss in appearance.

GENETICS

Tabebuia is a large genus containing about 100 species in tropical and subtropical America (9). Primavera is similar to *T. millsii* (Miranda) A. Gentry, which grows in southern Mexico with a disjunct population in Venezuela. Intermediate forms between the two species are found, and it is possible that both are in fact a single species (9). Botanical synonyms for primavera are *Roseodendron donnell-smithii* (Rose) Miranda and *Cybistax donnell-smithii* Rose (14).

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